

PATENT SPECIFICATION

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(54) MARKING DEVICE FOR ELONGATE ARTICLES

(71) We, SIEMENS AKTIENGESELLSCHAFT, a German Company, of Berlin and Munich, Germany, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to a marking device for applying markings to elongate articles moveable longitudinally relative to the device.

The invention is particularly, but not exclusively, concerned with a marking device for applying markings to insulated electrical conductors.

Insulated electrical conductors provided in the production of electrical cables and line wires, for example cores for communication cables, are usually provided with an identity marking in order to be clearly distinguishable as an individual core in the finished cables. This marking may comprise, for example, spaced coloured markings, particularly coloured rings.

In order to mark insulated electrical cores with coloured rings as the cores are being moved longitudinally, it is known to use revolving nozzle wheels or nozzle discs on both sides of the cores to be marked. The wheels or discs are positioned with their axes of rotation extending parallel to the direction of movement of the core. Spraying nozzles are fitted on the periphery of the nozzle wheel and serve to spray marking liquid, such as coloured liquid emerging as a jet of colour, transversely of the insulated electrical conductor, that is cross-wise of the core. To this end, the nozzle wheels are mounted on hollow shafts through which the coloured marking liquid can be pumped and then fed under pressure to the hollow nozzle wheels and to the discharge openings in the form of the spraying nozzles. Con-

sequently, the coloured marking is sprayed in radial direction through the spray nozzles in the shape of fine colour jets, whereby each jet of colour on crossing the conductor to be marked i.e. on striking the insulation of the conductor, produces a coloured semi-circle. A complete circular marking ring is formed by provision of a further nozzle wheel which is arranged offset with respect to the longitudinal direction of the core so as to produce a further semi-circle in conjunction with the first mentioned semi-circle in order to complete the formation of the marking ring. An example of such an arrangement is described and illustrated in more detail in German Patent Specification No. 1,172,331.

When it is required to change over from one type of marking to another, for example from a marking which in each case consists of two closely spaced coloured rings, to a different marking which in each case consists of single coloured rings more widely spaced apart, it is desirable to avoid the necessity to interchange the nozzle wheels so as to provide a particular nozzle wheel for each particular requisite marking. To this end, it has been proposed to provide the nozzle wheels with at least two rows of nozzles located adjacent to each other, there being an arrangement of screens or templates which are moveable in order to cover selectively one or more of the rows of nozzles. Thus, by appropriate movement of the screen or template, one or more marking rings can be formed as desired. One type of ring screen is adjustable in the direction of the nozzle wheels and is provided with a sharp edge which is directed against the periphery of the nozzle wheels, the ring screen being adjustable in order selectively to prevent marking being carried out by one or more of the rows of nozzles. However, the screen does not prevent ejection of marking liquid from the

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nozzles, but is provided with ring shaped catching members which are joined on both sides for the purpose of catching the sprayed-out marking liquid.

5 Thus, when using the adjustable type of ring screen, jets of marking liquid (coloured) emerge constantly from the nozzles even although a marking by one or
10 more of the rows of nozzles is not required. Although this marking liquid is unused and can be recycled, the throughput of marking liquid is relatively large with the result that the solvent contained in the coloured marking liquid can therefore
15 evaporate relatively quickly. This gives rise to changes in the consistency of the coloured marking liquid, which by suitable means must be regenerated.

20 It is an object of the invention to provide a marking device which can at least minimise the problem of the creation of a throughput of unused marking liquid.

A marking device according to the invention comprises a marking device for applying markings to an elongate article
25 moveable longitudinally relative to the device, the device comprising a hollow shaft through which a liquid or flowable marking material can be fed, a rotary element provided with peripheral marking applica-
30 tors which are communicable with the interior of the hollow shaft so as to be capable of applying markings to the elongate article, and closing means adjustable
35 selectively to block communication to one or more of the applicators.

The invention will now be described in more detail, by way of example only, with reference to the accompanying drawings in
40 which:—

Figure 1 is a sectional view of a known form of nozzle wheel marking device;

45 Figure 2 is a sectional view of a first embodiment of marking device according to the invention;

Figure 3 is a sectional view of a second embodiment of marking device according to the invention;

50 Figure 4 is a sectional view of a third embodiment of marking device according to the invention;

Figure 5 is a sectional view of a fourth embodiment of marking device according to the invention;

55 Figure 6 is an end view of the marking device shown in Figure 5; and

Figure 7 is a sectional view of a modification which may be applied to the embodiments of the invention.

60 Referring first of all to Figure 1 of the drawings, there is shown a known arrangement of nozzle wheel marking device, such as shown in German Patent Specification No. 1,172,331. The marking device comprises a nozzle wheel 1 which includes a

rotatable hollow shaft 2 to the end of which a flange 3 is fitted. A flat hollow cylinder 4 is mounted on the flange 3 and defines therewith a cylindrical hollow space 6 to which coloured marking liquid can be
70 fed through the hollow shaft 2 as shown by the arrows in Figure 1. The marking liquid flows to discharge openings formed as nozzles 5 provided in the periphery of the flat hollow cylinder 4. The nozzles 5
75 are arranged on peripheral lines of the flat hollow cylinder 4 whereby two adjacent rows of nozzles are provided through which marking liquid can be sprayed in the form of fine jets of colour. 80

Thus, the marking device may be employed to apply pairs of spaced rings to an elongate article moving longitudinally relative to the device. An elongate article in the form of an electrical cable can be
85 moved through a pipe 15 in the direction of the axis so as to receive one or two coloured rings from the marking device 1. In order to select the number of marking rings applied by the device, an axially
90 moveable hollow shaft 10 is mounted concentrically with respect to the hollow shaft 2 and has a flange 11 which carries a ring screen 12. Thus, upon axial movement of the shaft 10, the ring screen 12 can be
95 moved, with its sharp edge as shown, so as to cover none, one or two of the rows of nozzles 5. In the position shown in Figure 1, the ring screen 12 masks both nozzles 5 so that no marking takes place. However, 100 the ring screen 12 does not prevent ejection of marking liquid from the nozzles 5 in any of its axial positions, but is provided with catching chambers 13 and 14, provided on both sides of the ring screen 105 12, in order to catch jets of marking liquid emerging from the nozzles 5. This marking liquid in the catching chambers 13 and 14 may then be recycled, though it will be appreciated that a substantial throughput of marking liquid will occur during operation even when the ring screen 12 is moved to a position in which it prevents ring marking on an elongate article by one or more
110 of the rows of nozzles. This large throughput can be disadvantageous in that the solvent normally employed in coloured marking liquid can evaporate thereby affecting the consistency of the marking liquid which must be regenerated by suitable means. 120

Referring now to Figure 2 of the drawings, there is shown a first embodiment of marking device according to the invention. This differs from the arrangement described above with reference to Figure 1 in that it is not necessary to cover or catch the not required rows of jets of marking liquid. The marking device comprises a rotary element in the form of a nozzle 130

To provide for convenient angular adjustment of the rings 35 and 36, they are 65 formed internally with a non-circular cross-

In order to eliminate a blockage present 130

when switching on which temporarily closes the feed ducts and nozzles, power is applied by impact upon the piston rod 74 which applies a pressure wave upon the coloured marking liquid in the nozzle wheel 70 and the supply ducts. This pressure wave also affects the feed ducts and the spraying nozzles of the nozzle wheel and serves to loosen any blockages that have taken place.

The blockage clearance device illustrated in Figure 7 may be applied to any one of the previously described embodiments of the invention.

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WHAT WE CLAIM IS:—

1. A marking device for applying markings to an elongate article moveable longitudinally relative to the device, the device comprising a hollow shaft through which a liquid or flowable marking material can be fed, a rotary element provided with peripheral marking applicators which are communicable with the interior of the hollow shaft so as to be capable of applying markings to the elongate article, and closing means adjustable selectively to block communication to one or more of the applicators.

2. A device according to claim 1, in which the applicators are communicable with the interior of the hollow shaft through ducts or pipes provided in or for the rotary element.

3. A device according to claim 2, in which the ducts or pipes extend radially from a hollow space communicating with the interior of the hollow shaft, and in which the closing means comprises a blocking member moveable longitudinally and/or rotatably within said hollow space to block communication between selected ducts or pipes and the hollow space in accordance with the selected applicator(s) to be blocked.

4. A device according to claim 3, in which the blocking member comprises a longitudinally moveable piston having apertures for a passage therethrough of the marking material.

5. A device according to claim 3 or 4, in which holes are provided for communication of the ducts or pipes with the hollow space, said holes being arranged in pairs or in groups in the wall surrounding the hollow space and staggered in relation to the axis thereof in co-axial peripheral lines.

6. A device according to claim 3, in which the blocking member comprises one or more cylindrical rings located rotatably within the hollow space, said ring (s) having radial apertures which can be rotated into, and out of, register with holes provided in the wall surrounding the hollow space at the inlet ends of the ducts or pipes.

7. A device according to claim 6, in which the or each ring has a non-circular internal cross-section for a section of a correspondingly shaped member to effect rotation thereof.

8. A device according to claim 6 or 7, comprising two or more cylindrical blocking rings arranged adjacent to each other in the hollow space, in which the ducts or pipes extend radially of said rings to applicators arranged on a common peripheral line of the rotary element.

9. A device according to any one of claims 5 to 8, in which two or more ducts or pipes are connectable by a common hole to the hollow space.

10. A device according to any one of the preceding claims, including pressure applying means operable to effect clearance of blockages in the supply of marking material to the applicators.

11. A device according to claim 1 and substantially as hereinbefore described with reference to, and as shown in Figure 2 of the accompanying drawings.

12. A device according to claim 1 and substantially as hereinbefore described with reference to and as shown in Figure 3 of the accompanying drawings.

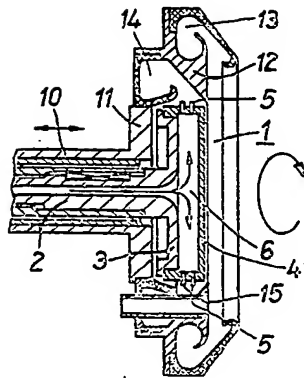
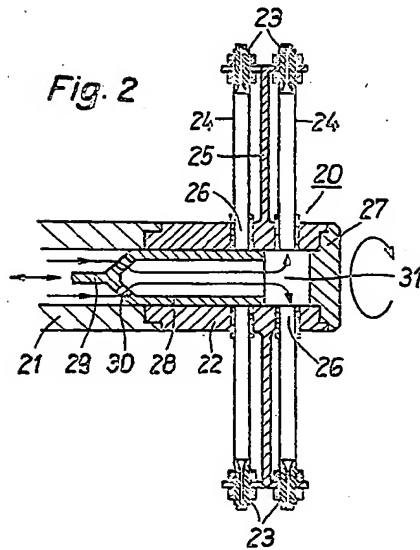
13. A device according to claim 1 and substantially as hereinbefore described with reference to and as shown in Figure 4 of the accompanying drawings.

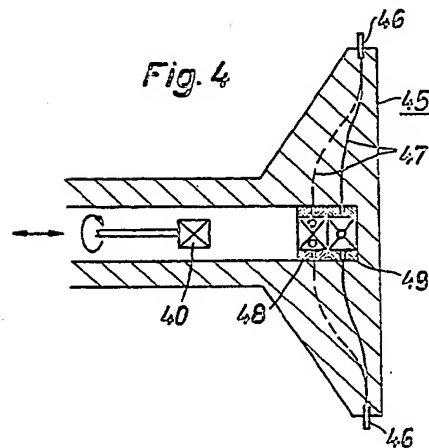
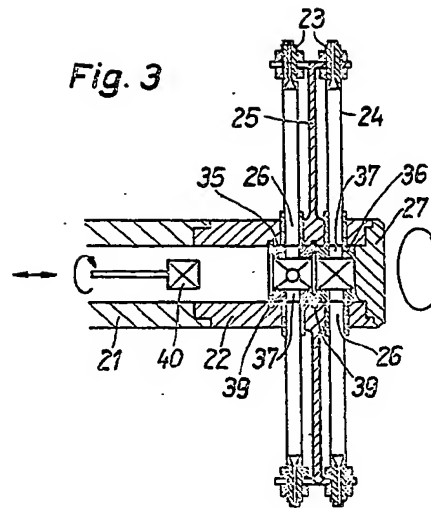
14. A device according to claim 1 and substantially as hereinbefore described with reference to and as shown in Figures 5 and 6 of the accompanying drawings.

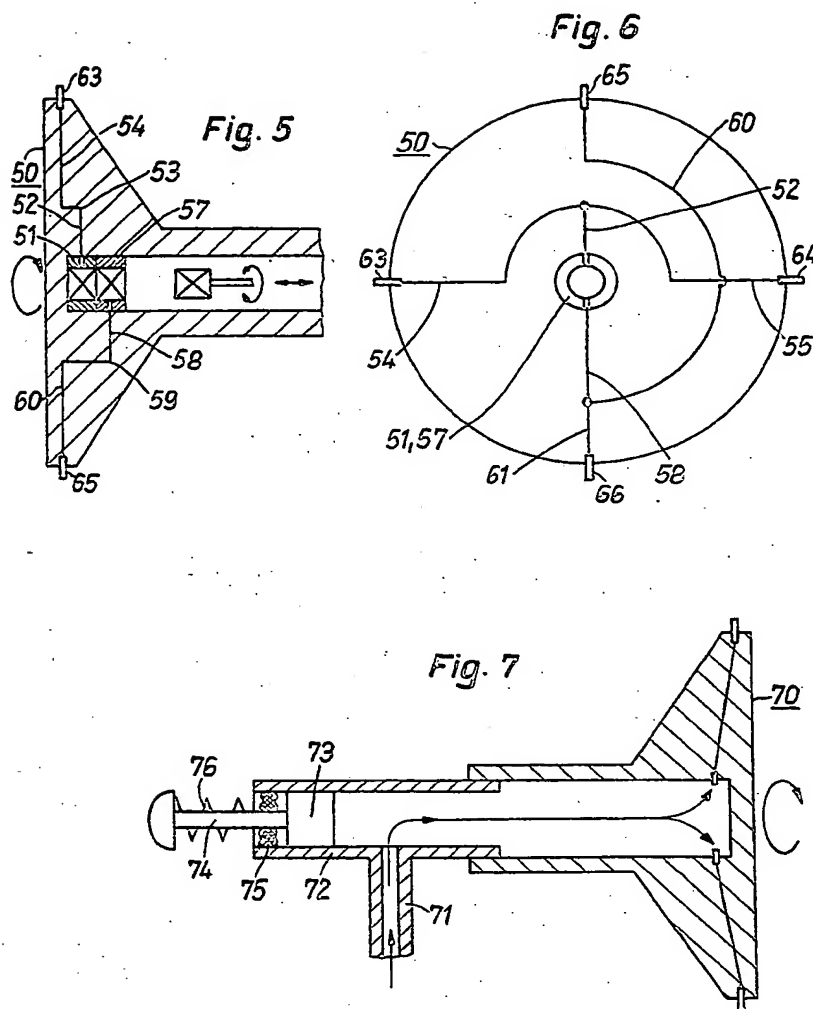
15. A device according to any one of claims 11 to 13 as modified by Figure 7 of the accompanying drawings.

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Fig. 1*Fig. 2*





Dec. 13, 1955

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2,726,631

STRAND COLORING APPARATUS

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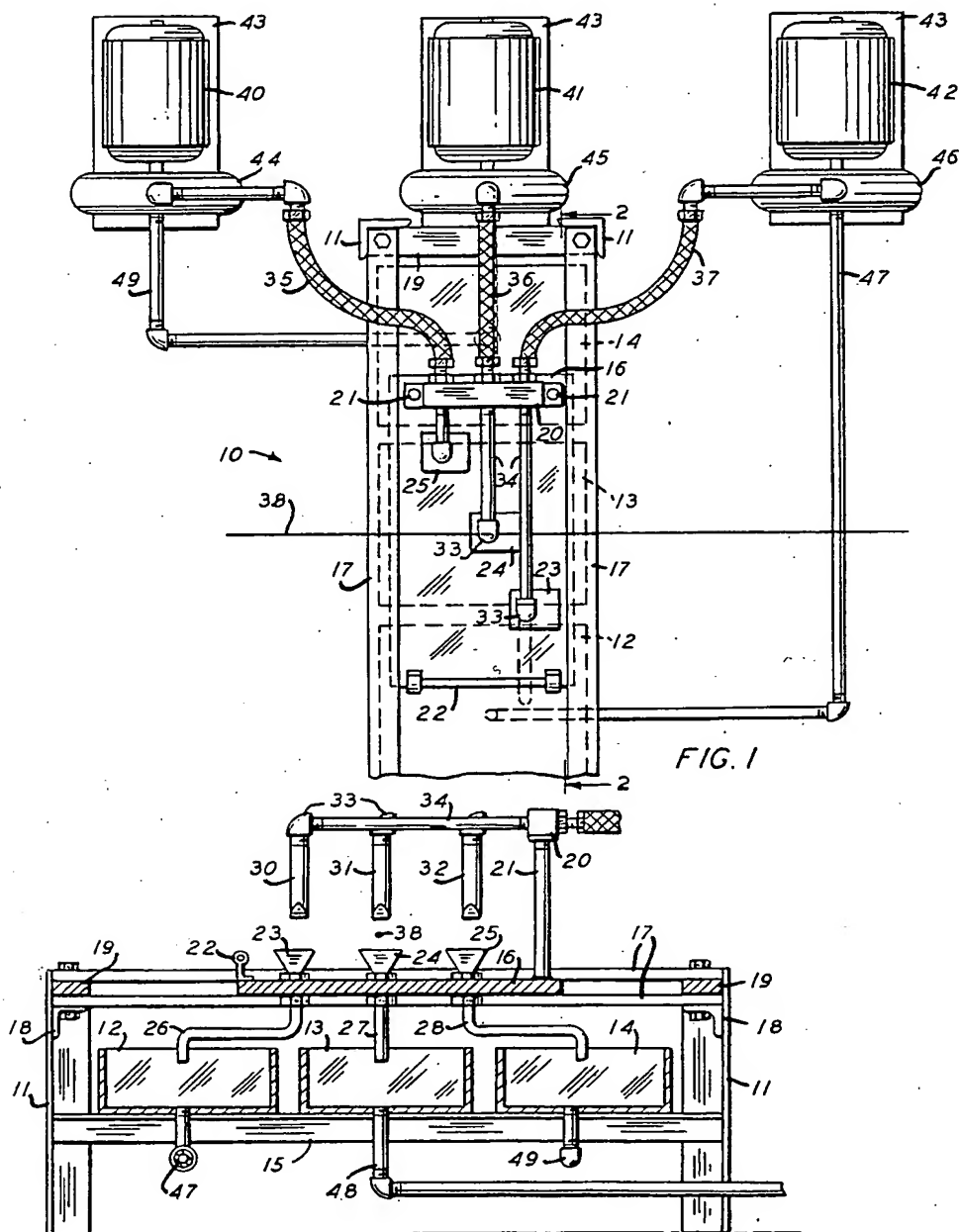


FIG. 2

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2,726,631

STRAND COLORING APPARATUS

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3 Claims. (Cl. 118—313)

This invention relates to strand coloring apparatus, and more particularly to apparatus for applying a coloring fluid to a continuously advancing strand, such as an insulated conductor.

In the manufacture of cables which are used in the communication field, the cable is frequently composed of a plurality of insulated conductors. Because of the large number of similarly constructed insulated conductors contained within a single cable, it is necessary to provide means for identifying single conductors, or groups of conductors, contained therein. An obvious means of identifying the various conductors, and one which has been known to the art for a long time, has been the application of insulation of different colors to the various conductors.

When one is desirous of coloring an insulated conductor for purposes of identification, and the insulating of the conductor involves the application of an extrudable material by passing the conductor continuously through a conventional plastics extruder, one must make a choice between introducing colored plastic material into the extruder as against applying the coloring matter to the insulation subsequent to extrusion. The former method has proved costly because it involves intermittent operation of the extrusion apparatus, since it is necessary to shut down the extruder and dismantle the tools in order to thoroughly purge the extruder of insulating material when it is desired to change from one color to another.

Accordingly, it has been suggested that a covering of a plastic insulating material be applied to the conductor by means of an extruder, and that a liquid coloring material be applied to the covering immediately after extrusion. However, for certain purposes the apparatus heretofore known has not proved to be entirely satisfactory.

An object of this invention is to provide new and improved strand coloring apparatus.

Another object of this invention is to provide new and improved apparatus for applying a coloring fluid to a continuously advancing strand, such as an insulated conductor.

A further object of this invention is to provide new and improved strand coloring apparatus which permits changing from one color to another with substantially no scrap and with no interruption of extruder operation.

An apparatus illustrating certain features of this invention may comprise means for continuously supplying a stream of coloring fluid, means for directing the stream generally across the path traversed by a continuously advancing strand, and means for moving the stream of coloring fluid into and out of contact with the strand.

A complete understanding of the invention may be obtained from the following detailed description of an apparatus constituting a specific embodiment thereof, when read in conjunction with the appended drawings, in which:

Fig. 1 is a plan view of an apparatus embodying the invention with certain portions broken away, and

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Fig. 2 is a vertical section taken along line 2—2 of Fig. 1.

Referring now in detail to the drawings, Fig. 1 shows a frame, designated generally at 10, supported by legs 11—11, which are suitably secured to the floor. A plurality of containers 12, 13 and 14 are supported within the frame 10 by angle irons, such as the angle iron 15 (Fig. 2). A plate 16 is slidably mounted between two pairs of bars 17—17 secured to the legs 11—11 by means of angle clips 18—18 and spaced apart by members 19—19. A pipe support 20 is secured to the plate 16 by means of posts 21—21. The plate 16 is fitted with a handle 22 and is freely movable along the guideway formed by the bars 17—17, the maximum amplitude of movement being controlled by the abutment of the sides of the plate 16 with the members 19—19.

A plurality of funnels 23, 24 and 25 are rigidly mounted on the plate 16 by means of suitable pipe couplings. A plurality of spouts 26, 27 and 28, one for each funnel, each leading to a separate one of the containers, are attached to the bottom of the plate 16 in a suitable manner so as to provide a conduit from each funnel to the containers 12, 13 and 14, respectively. As shown in Fig. 2, the configuration of the spouts 26, 27 and 28 and the size of the containers are such as to eliminate interference between these members as the plate 16 is advanced to the right or to the left. The spouts may be made of flexible plastic tubing of sufficient length to permit free motion of the plate 16 without withdrawing the tubing from its associated container.

A series of nozzles 30, 31 and 32, one for each of the funnels 23, 24 and 25, are mounted in the pipe support 20 by means of elbows 33—33 and nipples 34—34, so that each nozzle is immediately above one of the funnels. Flexible hoses 35, 36 and 37 are suitably connected to the nipples 34—34. As shown in Fig. 2, sufficient clearance is provided between each nozzle and its associated funnel to permit a strand, such as an insulated conductor 38 to pass therebetween.

Electric motors 40, 41 and 42 are mounted on plates 43—43 suitably affixed to the floor. Positive displacement, gear pumps 44, 45 and 46 are also mounted on the plates 43—43, each operatively connected to its respective motor. The discharge side of each of the pumps 44, 45 and 46 is connected to the flexible hoses 35, 36 and 37, respectively. The use of the flexible hoses makes it possible to advance the plate 16 to the right or to the left freely. One end of each of inlet pipes 47, 48 and 49 is connected to the inlet side of the pumps 44, 45 and 46, respectively, while the other end of each pipe is connected to the particular container from which a given pump withdraws fluid.

From the above description, it is apparent that this embodiment of the invention contemplates a plurality of fluid circuits, in which each circuit includes a container connected by suitable piping to an inlet side of a pump, thence through a flexible hose to a nozzle, a funnel, and through a spout back to the container.

Operation

Each of the containers 12, 13 and 14 is filled with a coloring fluid of a different hue. Upon the operation of a pump, such as the pump 44, fluid is drawn from the container 14 through the pipe 49 to the pump 44. From the pump 44 the fluid is advanced continuously through the flexible hose 35, the nozzle 32, the funnel 25, and the spout 28, back into the container 14. Coloring of the continuously advancing insulated conductor 38 is accomplished simply by moving the plate 16 along its slide until the stream of coloring fluid supplied by the pump 44 falls upon the advancing conductor.

In order to maintain a continuous flow of fluid, and in

order to color the surface of the advancing conductor completely, the quantity of fluid supplied by the pump 44 is greatly in excess of the quantity which would be required to cover a unit length of insulated conductor using a conventional applicator, such as a brush.

When it is desired to change the color being applied to the advancing conductor from that which has been placed in the container 14 to that which has been placed in another container, such as the container 13, without interrupting the continuous advance of the conductor, the pump 45 is placed in operation. The operation of the pump 45 causes a stream of a colored fluid of another hue to pass from the nozzle 31 to the funnel 24, and a change of the color being applied to the advancing conductor may be rapidly accomplished, and with substantially no scrap, by shifting the plate 16 until the colored stream passing from the nozzle 31 to the funnel 24 contacts the insulated conductor.

A typical coloring fluid, and one which would be suitable for coloring a plastic insulation, may be composed of a pigment, such as Blue Toner, a dispersing agent, such as light process oil, and a vehicle, such as carbon tetrachloride, and may be combined in the following proportions: 10 grams of pigment, 60 milliliters of oil, and 1200 milliliters of carbon tetrachloride.

Typical plastic insulating materials, which may be used in the practice of this invention, may include compounds of polyvinyl chloride resins, or polyethylene resins which are applied in cellular form.

While the above-described apparatus operates upon a single strand, it is further obvious that it may readily be adapted to operate upon a plurality of advancing strands.

What is claimed is:

1. An apparatus for applying to a strand advancing longitudinally along a predetermined path a colored fluid selected from a plurality of differently colored fluids, which comprises a support positioned adjacent to and movable transversely across the path of the strand, a plurality of nozzles directed generally towards the path of the strand and mounted spacedly on the support in a row which extends transversely across said path, a plurality of fluid supply means connected to the nozzles to supply one of a plurality of differently colored fluids to each of the nozzles, means for moving the support to a plurality of positions spaced transversely across the path of the strand to bring a selected one of the nozzles into alignment with said path and direct a single colored fluid onto the advancing strand, and a plurality of separate containers one for each of the differently colored fluids posi-

tioned below the nozzles to catch the fluids emitted by the nozzles.

2. An apparatus for applying to a strand advancing longitudinally along a predetermined path a colored fluid selected from a plurality of differently colored fluids, which comprises a frame positioned adjacent to the path of the strand, a track mounted on the frame and extending transversely across said path, a support mounted slidably upon the track, a plurality of nozzles directed generally towards the path of the strand and mounted spacedly on the support in a row which extends transversely across said path, a plurality of pumps connected to the nozzles to supply one of a plurality of differently colored fluids to each of the nozzles, means for moving the support along the track to bring a selected one of the nozzles into alignment with said path and thereby direct a single colored fluid onto the advancing strand, and a plurality of separate containers one for each of the nozzles and their associated pumps mounted on the frame below the nozzles to catch the differently colored fluids emitted by the nozzles.

3. An apparatus for applying to a strand advancing longitudinally along a predetermined path a colored fluid selected from a plurality of differently colored fluids, which comprises a frame positioned adjacent to the path of the strand, a plurality of containers mounted on the frame one for each of a plurality of differently colored fluids, a track mounted on the frame above the containers and extending transversely across the path of the strand, a support mounted slidably upon the track, a plurality of nozzles directed downwardly each toward one of the containers and mounted spacedly on the support above the path of the strand in a row which extends transversely across said path, a plurality of constant displacement pumps each connected to one of the containers, a plurality of flexible hoses connecting the pumps with the nozzles to supply one of the plurality of differently colored fluids to each of the nozzles, and means for moving the support along the track to bring a selected one of the nozzles into alignment with said path and thereby direct a stream of colored fluid emitted from the selected nozzle onto the advancing strand.

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